Develop A Community Resilience Plan

Ch 4: Determine Goals and Objectives

Presenter:

Chris D Poland
Consulting Engineer
NIST Disaster Resilience Fellow

Ch 4. Determine Goals and Objectives

- Establish Long-Term Community Goals
- Establish Desired Performance Goals for the Built Environment
  - Recovery phases
  - Performance levels for buildings
  - Functional levels for building clusters and infrastructure systems
- Community Hazards and Levels
  - Prevailing Hazards
  - Hazard Levels (3)
  - Hazard Impact
- Anticipated Performance of Existing Built Environment
  - Anticipated Recovery of Function
- Summarize the Results

Establish Long Term Community Goals

Long Term goals that improve the community can guide the prioritization and implementation process.

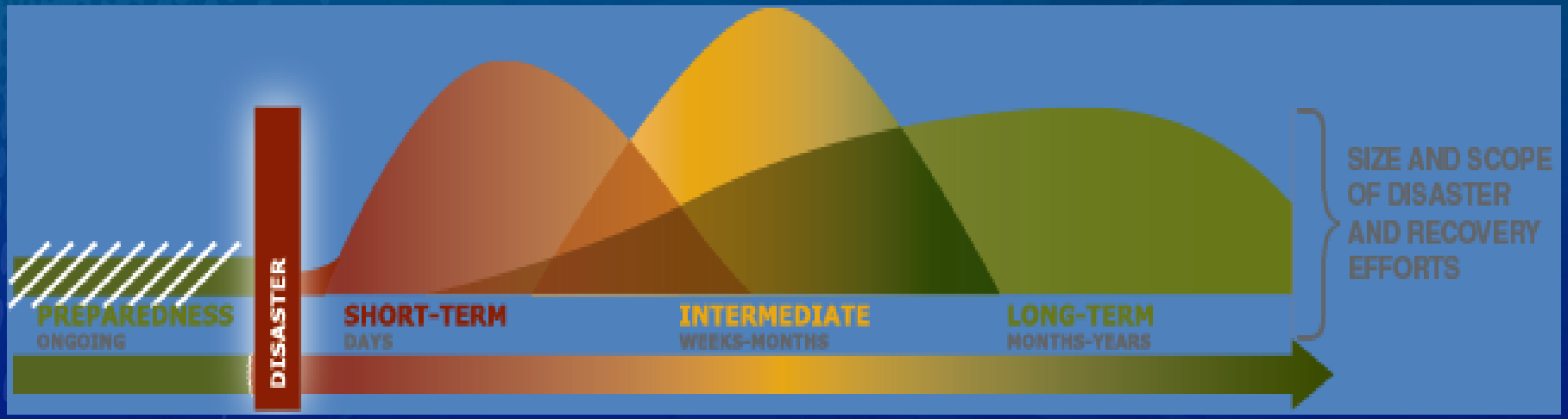
- Improve reliability of infrastructure systems
- Enhance community functions
- Reduce travel time impacts to residents and businesses.
- Revitalize an existing blighted area

Establish Desired Performance Goals for the Built Environment

- Define in terms of extent of damage and time needed to restore functionality.
- Used to help prioritize repair and reconstruction efforts.
- Based on the needs of the social institutions and local economy and their dependencies.
- Should also consider the role of a facility or system outside of the community.
- Suggests criteria for new and retrofit of existing construction.

Recovery of the Built Environment

Organize around restoring functionality over time



When is each cluster and system needed for recovery?

Source: National Disaster Recovery Framework

Functionality Needs For Recovery

- **Short-Term**: Secure, Rescue, Stabilize, Clear Routes
  - Clusters: Critical Facilities, Emergency Housing
    Related Infrastructure Systems
- **Intermediate**: Restore Neighborhoods, meet social needs
  - Clusters: Housing, healthcare, main street, schools, Churches
  - Related Infrastructure Systems
- **Long-Term**: Community Social and Economic Recovery
  - Clusters: Commercial and Industrial Businesses
  - Related Infrastructure Systems

Performance Levels for Buildings

- **Level of Functionality** after the event
  - Operational (Short term)
  - Useable during Repair (Short to intermediate term)
  - Not Usable (Intermediate to long term)
  - Collapse (Mitigate when possible)

- **Recovery Time**
  - Days (Short term)
  - Weeks (Intermediate term)
  - Months (Long term)




Functionality Levels During Recovery

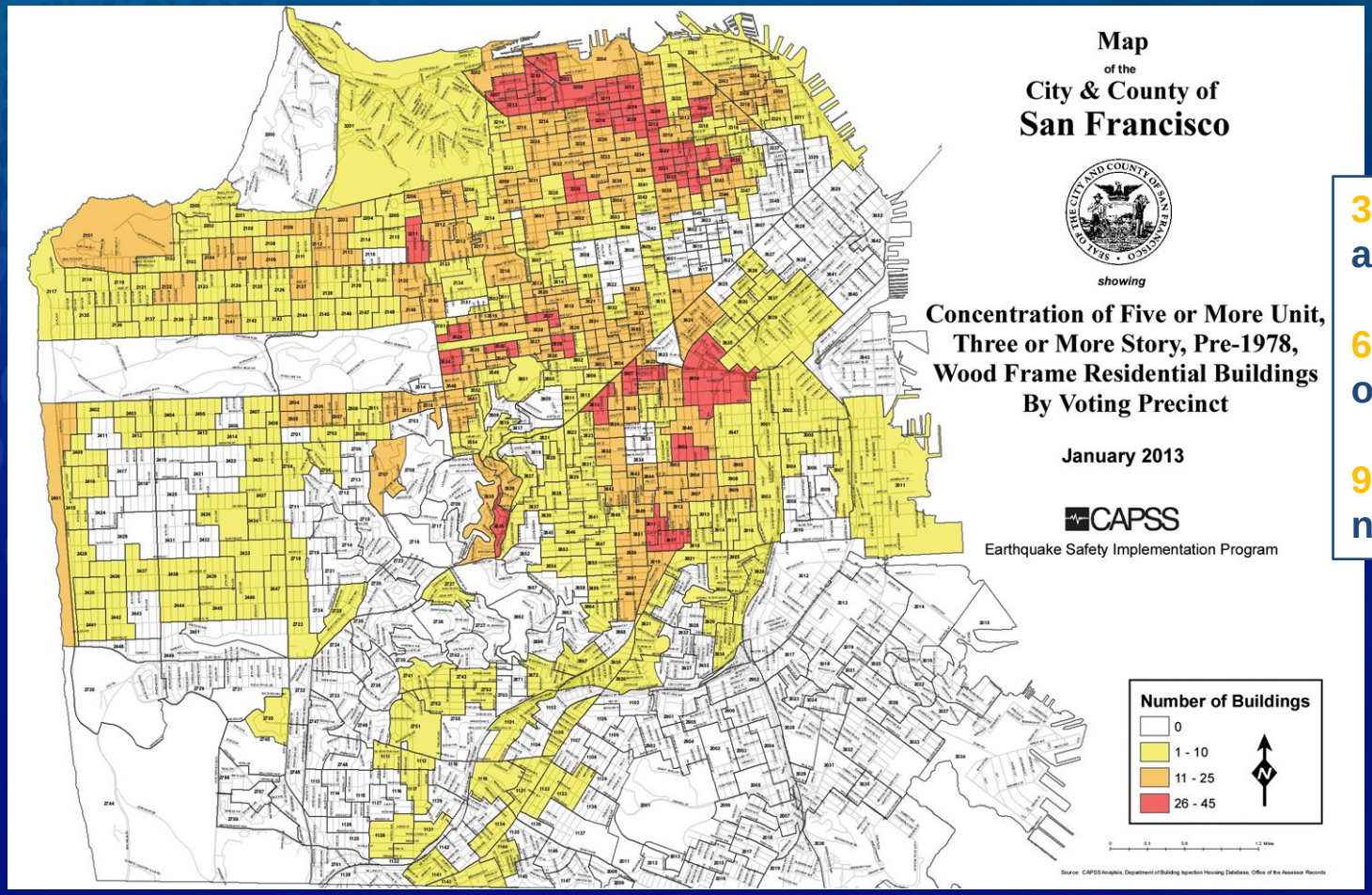
Buildings clusters & supporting infrastructure systems

- Individual buildings assigned performance that reflects role in the community
- Building clusters serve social needs and institutions and need a measure of functionality

Category	Performance Level
30% functional	Minimum number needed to initiate the activities assigned to the cluster
60% functional	Minimum number needed to initiate usual operations
90% functional	Minimum number needed to declare cluster is operating at normal capacity

Set Desired Performance Goals

Recovery of building clusters and supporting infrastructure can be expressed as a percentage of functional building's in a cluster



30% Initiate assigned activities

60% Initiate usual operations

90% Operating at normal capacity

Determine and Characterize Hazards

- **Prevalent Hazards**
  - Wind, Earthquake, Inundation
  - Fire, Snow, Rain
  - Human caused or Technological

- **Hazard Level:**
  - Routine — Level that is expected to occur frequently
  - Expected — Level equal to the design level used for buildings
  - Extreme — Level that is the maximum considered possible

- **Hazard Impact**:
  - Area affected — Defined as “local, community, or regional”
  - Disruption Level — Defined as “minor, moderate, or severe”

Hazard Impact Examples

Event	Community	Year	Level	Affected Area	Disruption Level
DaVinci Apt Fire	Los Angeles	2014	Extreme	Localized	Minor
Moore OK Tornado	Moore	2013	Extreme	Localized	Moderate
Loma Prieta EQ	Watsonville	1989	Expected	Regional	Severe
Loma Prieta EQ	San Francisco	1989	Expected	Community	Moderate
Superstorm Sandy (wind)	New Jersey	2012	Routine	Regional	Moderate
Superstorm Sandy (storm surge)	New Jersey	2012	Expected	Regional	Severe

Moore, OK

Hoboken, NJ

Watsonville, CA

Anticipated Performance of Existing Built Environment

- Estimated anticipated performance (restoration of functionality) during recovery depends
  - Damage level - Condition and capacity of structural and nonstructural systems
  - Recovery time - Materials, equipment, and labor needed for restoration
  - Dependencies on other systems that may be damaged

Example Summary Resilience Matrix

Example: Routine, Localized, Minor disruption

Functional Category: Cluster	Overall Recovery Time for Hazard and Level Listed								
	Routine Hazard Level								
	Phase 1 – Short-Term			Phase 2 – Intermediate			Phase 3 – Long-Term		
	Days	Days	Days	Wks	Wks	Wks	Mos	Mos	Mos
	0	1	1-3	1-4	4-8	8-12	4	4-24	24+
Critical Facilities									
Buildings	90%	X							
Transportation	90%	X							
Energy	90%	X							
Water	90%		X						
Waste Water		90%	X						
Communication	90%		X						
Emergency Housing									
Buildings	90%		X						
Transportation	90%	X							
Energy	90%	X							
Water	90%		X						
Waste Water		90%	X						
Communication	90%			X					
Housing/Neighborhoods									
Buildings	90%		X						
Transportation		90%	X						
Energy		90%	X						
Water		90%		X					
Waste Water			90%	X					
Communication		90%		X					
Community Recovery									
Buildings		90%	X						
Transportation			90%	X					
Energy		90%	X						
Water			90%	X					
Waste Water			90%	X					
Communication		90%		X					

IOWA 2014

Example Summary Resilience Matrix

Example: Expected, Community, Moderate

Functional Category: Cluster	Overall Recovery Time for Hazard and Level Listed Expected Hazard Level								
	Phase 1 – Short-Term			Phase 1 – Short-Term			Phase 1 – Short-Term		
	Days 0	Days 1	Days 1-3	Wks 1-4	Wks 4-8	Wks 8-12	Mos 4	Mos 4-24	Mos 24+
Critical Facilities									
Buildings	90%							X	
Transportation		90%	X						
Energy		90%	X						
Water			90%		X				
Waste Water				90%				X	
Communication		90%		X					
Emergency Housing									
Buildings				90%					X
Transportation			90%	X					
Energy			90%	X					
Water			90%		X				
Waste Water				90%				X	
Communication				90%	X				
Housing/Neighborhoods									
Buildings						90%			X
Transportation			90%	X					
Energy			90%	X					
Water				90%				X	
Waste Water					90%			X	
Communication				90%			X		
Community Recovery									
Buildings								90%	X
Transportation				90%	X				
Energy			90%	X					
Water				90%				X	
Waste Water							90%	X	
Communication				90%			X		

Sandy

Example Summary Resilience Matrix

Example: Extreme , Regional, Severe Disruption

Functional Category: Cluster	Overall Recovery Time for Hazard and Level Listed								
	Extreme Hazard Level								
	Phase 1 – Short-Term			Phase 1 – Short-Term			Phase 1 – Short-Term		
	Days	Days	Days	Wks	Wks	Wks	Mos	Mos	Mos
	0	1	1-3	1-4	4-8	8-12	4	4-36	36+
Critical Facilities									
Buildings						90%			X
Transportation			90%		X				
Energy				90%					
Water							90%	X	
Waste Water					90%			X	
Communication	90%			X					
Emergency Housing									
Buildings						90%			X
Transportation				90%		X			
Energy				90%					
Water					90%		X		
Waste Water					90%			X	
Communication				90%			X		
Housing/Neighborhoods									
Buildings							90%		X
Transportation				90%		X			
Energy				90%	X				
Water					90%			X	
Waste Water						90%		X	
Communication					90%		X		
Community Recovery									
Buildings								90%	X
Transportation				90%		X			
Energy				90%	X				
Water							90%		X
Waste Water								90%	X
Communication					90%			X	

Tokohu